

Pest Alert

Plant Protection and Quarantine

February 2006

Get the Facts on Citrus Greening, or Huanglongbing



Figure 1—In the foreground, a pomelo (*Citrus maxima*) displays the yellow shoots that are symptomatic of Huanglongbing.



Figure 2—Feeding damage to citrus leaves caused only by the African citrus psyllid, *Trioza erytreae* (del Guercio).



Figure 3—Typical blotchy mottling symptoms of Huanglongbing on *Citrus* spp.

What Is It?

Citrus greening (also yellow dragon disease or Huanglongbing) is one of the most serious citrus diseases (fig. 1). It greatly reduces citrus production in India, Asia, Southeast Asia, the Arabian Peninsula, and Africa. The bacteria that cause greening—three species of *Liberibacter*—probably originated in China in the early 1900s. In countries where the disease is endemic, citrus trees decline within 5 to 8 years after planting and rarely bear usable fruit.

The pathogen that causes citrus greening inhabits the phloem (nutrient-carrying tissues) of affected plants and cannot be cultured in the laboratory. Three species of the pathogen, *Liberibacter africanus*, *L. asiaticus*, and *L. americanus*, cause the same symptoms. The African strain develops only under cool temperatures (between 20 and 25 °C), while the Asian strain develops under both cool and warm temperatures (between 20 and 35 °C). The third *Liberibacter* species has been described in Brazil and causes symptoms of greening there.

In August 2005, scientists from the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) confirmed the first U.S. detection of *L. asiaticus* on pomelo samples of tree leaves and fruit collected, tested, and submitted to APHIS by the Florida Department of Agriculture and Consumer Services (FDACS).

What To Look for and Where To Look

1. Check for symptoms.

Citrus plants affected by citrus greening may not show symptoms for years. As the pathogen moves within the tree, whole branches and, eventually, the entire tree may progressively turn yellow (fig. 2). The most characteristic foliage symptoms of citrus greening are blotchy mottling (fig. 3) of the leaves and yellowing of leaf veins and shoots. The newest leaves may display symptoms that can be misdiagnosed as signs of zinc deficiency. Older leaves take on the mottling characteristic of greening. Other symptoms are twig dieback, poor flowering, and stunted growth.

Fruit from diseased trees are small and often misshapen. Typically, some green color remains even on ripe fruit. Greening-affected fruit taste bitter, medicinal, and sour. Seeds usually abort, and fruit set (formation) is poor. Symptoms vary according to time of infection, stage of the disease, tree species, and tree maturity.

2. How is greening transmitted?

Citrus greening transmitted? Citrus greening is primarily spread by two species of psyllid insects. The Asian citrus psyllid, *Diaphorina citri* Kuwayama, is widely distributed in southern Asia and parts of Mexico and Brazil (figs. 4 and 5). The African citrus psyllid, *Trioza erytreae* (del Guercio), can be found in several African countries (figs. 6 and 7).

In 1998, *D. citri* was detected for the first time in the United States in Palm Beach County, FL. The insect is believed to have spread in Florida on nursery specimens of orange jasmine, an ornamental landscape plant and preferred host of *D. citri*. By September 2000, the pest had spread to 31 counties in Florida. *D. citri* and one of its



Figure 4—Adult Asian citrus psyllid, *Diaphorina citri* Kuwayama.

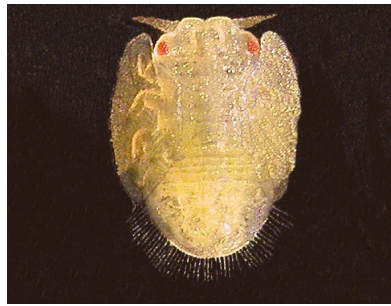


Figure 5—Nymph of the Asian citrus psyllid.



Figure 6—Adult of the African citrus psyllid, *Trioza erytreae* (del Guercio).



Figure 7—Nymph of the African citrus psyllid.

parasites are also present in the Rio Grande Valley of Texas, but the disease has not yet been detected there.

Citrus greening can also be transmitted by grafting diseased budwood. Although the pathogens are bacteria, the disease does not spread by casual contamination of personnel and tools or by wind and rain.

3. Where might greening come from? Citrus greening has been reported in the following African, Asian, and South American countries: Bangladesh, Bhutan, Brazil, Burundi, Cambodia, Cameroon, Central African Republic, China, Comoros, Ethiopia, Hong Kong, India, Indonesia, Japan, Kenya, Laos, Madagascar, Malawi, Malaysia, Mauritius, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Reunion, Rwanda, Saudi Arabia, Somalia, South Africa, Sri Lanka, Swaziland, Taiwan, Tanzania, Thailand, Vietnam, Yemen, and Zimbabwe.

What Plants Does the Disease Prefer?

Nearly all citrus species and many citrus relatives (e.g., limeberry and trifoliate orange) are susceptible to citrus greening. Sweet orange and mandarin orange are highly susceptible to the disease; sour orange, grapefruit, and lemon are moderately susceptible. For a complete list of citrus hosts, please visit <http://www.aphis.usda.gov/ppq/ep/citrus_greening/index.html>.

All the plant species mentioned in the preceding paragraph are potential hosts for the psyllid vector as well as the citrus greening disease. However, several citrus relatives are hosts for the psyllid but have not conclusively been shown to be hosts for the disease. Those species are important as reservoirs or pathways for infected insect vectors to noninfested areas.

What Plants Do the Psyllid Insects Prefer?

The psyllid insects feed on all the citrus and other host plants listed above, but they prefer orange jasmine, *Murraya paniculata*. Ironically, this species is not thought to be a host for the disease.

Where Should I Report Suspect Disease Symptoms or Psyllid Insect Sightings?

To have specimens properly identified, please contact your State department of agriculture or the plant-disease diagnosis clinic at your State's land-grant university.

For Additional Information

For more information on citrus greening, including program updates, factsheets, regulatory actions, control and testing protocols, and links to other sites, please visit <http://www.aphis.usda.gov/ppq/ep/citrus_greening/index.html>.

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United States Department of Agriculture
Animal and Plant Health
Inspection Service
Program Aid No. 1851